

Appl. No. 10/679,348
Examiner: LEE, EDMUND H, Art Unit 1732
In response to the Office Action dated March 24, 2006

Date: June 24, 2006
Attorney Docket No. 10116631

AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph begin on page 1, line 12 to page 2 line 20 with the following paragraph:

Liquid crystal displays have the advantages of small volume, light weight, low power consumption, low radiation, excellent image quality, broad applications, and are widely applied in the consumer electronic products or computer products, such as medium to small portable TVs, mobile phones, camcorders, notebook computers, desktop computers and projection TVs, etc. More particularly, the main stream of LCD is using in flat panel display system. The key component for presenting better brightness, vividness, and color-ness in liquid crystal displays is in the color filter. Therefore, the color filter has a full potential in the LCD development. The biggest market of the color filter is in notebook industry. More particularly, it focuses on the color filter with big-area, low pollution, and low cost characters. The main stream of the conventional color filter manufacture is to implement the lithography process. It mainly comprises three steps: One is coating for three primary colors of R, G, and B color filtering layers ~~R, G, and B photo-resists~~. Another step is proximity alignment exposure. The other step is development. Among the steps, the development of the color filtering layer photo-resist coating technique is paid for more attention, such on the rotational coating method. However, the shortage of the conventionally rotational coating method has a low usage in materials, which is about 1 to 2%. More, it also needs more CF processes thereto cause more wearing damages and increase more contacting chances with chemical liquids.

Please replace the paragraph begin on page 2, line 21 to page 3 line 11 with the following paragraph:

Another coating technique is provided by Dai Nippon Printing DNP. The color filter is manufactured by inkjet printing method applying on the glass substrate. The method overcomes the low rate of using materials while using the rotational coating method. However, it needs to do bank between the color filtering layers ~~photo-resists~~ for against color mixing in color filtering layers ~~photo-resists~~, and the bank needs to be formed while doing CF process. Further, the used chemical liquids in the process easily cause damage on the substrate. More, color filtering

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layer photo-resist is directly printing on the surface of the substrate thereto the surface tension is less than the cohesive force. It, therefore, has a worse coating character.

Please replace the paragraph begin on page 4, line 14 to page 5 line 2 with the following paragraph:

Further, it processes coating on the plane layer. The feature of the process is that the substrate is one-piece to be formed thereto implement a big-area filter. Also, it does not need to use CF process thereto avoid any damages from using chemical liquids and decrease environmental pollution. Another method is that the color filtering layer photo-resist jetted into the groove, and therefore, solves the coating problem caused from the surface tension by the inkjet printing method. The present invention can fully implement the purpose of manufacturing color filter based on achieving a simple manufacture and a low cost.

Please replace the paragraph begin on page 5, line 12 to page 5 line 20 with the following paragraph:

Figure 3 is an example of the present invention showing the groove of the substrate where the color filtering layer photo-resist is jetted;

Figure 4a is one of the preferred embodiments showing a plastic substrate filled with color filtering layers photo-resists according to the present invention;

Figure 4b is another preferred embodiment of the present invention showing a plastic substrate filled with color filtering layers photo-resists;

Please replace the paragraphs begin on page 7, line 14 to page 10 line 23 with the following paragraphs:

The steps of the color filter manufacturing method for a plastic substrate according to the present invention can be described below. First, please referring to Figure 2a, it uses three-bump areas 101, 102, and 103 of the master mold 10 to extrude a substrate 20. The substrate is with three corresponding grooves 21, 22 and 23 as shown in Figure 2b. Then, the three

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grooves 21, 22 and 23 of the substrate are filled with three primary colors of R(31), G(32) and B(33) color filtering layers ~~R-31 G-32 and B-33 photo-resists~~ in order by using the inkjet printing method as shown in Figure 3.

As shown in Figure 4, the color filtering layers ~~photo-resists~~ 31, 32 and 33 in the above saying groove bring the surface tension thereto form an arc surface 34 in the surface of the color filtering layer ~~photo-resist~~ which is higher than the substrate 20. In order to overcome the problem, the side of the groove in the plastic substrate can be formed as a rough surface, for example, the surface with multiple pits. Therefore, it can decrease the protruding heights of the color filtering layers ~~photo-resists~~ 31, 32, and 33 after molding. Then, the topside forms as a plane surface 35 as shown in Figure 4b.

The consequent step of a color filter manufacturing method for a plastic substrate according to the present invention can be seen in Figure 5. The black photo-resist 50 is similarly jetted into the gaps of the color filtering layers ~~photo-resists~~ 31, 32 and 33 by using the inkjet printing method. Finally, the top of the above saying color filtering layers ~~photo-resists~~ 31, 32 and 33 is covered with a passivation layer 40 as shown in Figure 6 for implementing a so-called color filter manufacture of the present invention. The present invention can divide it as two types, which are the transparent type and the reflective type.

According to the color filter manufacturing method for a plastic substrate as mentioned above for the present invention, the black photo-resist 50 is disposed on the same side of the protruding side in each color filtering layers ~~photo-resists~~ 31, 32 or 33 as shown in Figure 5 and Figure 6. Another preferred embodiment of the present invention sets the black photo-resist on the opposite side of protruding side in above saying color filtering layers ~~photo-resists~~ 31, 32, and 33. As can be seen in Figure 7, the bottom of the substrate 30 forms multiple grooves 36. The multiple grooves 36 are placed on the bottom of the substrate 30 corresponding to the gaps of color filtering layers ~~photo-resists~~ 31, 32 and 33. According to the molding method by using the above saying black photo-resist, the groove 36 is filled with the black photo-resist 51 from jetting. Further, the passivation layer 41 is filling on the gap of the color filtering layers ~~photo-resists~~ 31, 32, and 33 in the top surface of the substrate 30 as shown in Figure 8.

Apart from the application mentioned above for the present invention using in either a reflective or a transparent color filter, it also can apply to the transfective filter in the productions. A shown in Figure 9, the master mold has been changed from its structure to

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extrude a plastic substrate 60 with different heights of the grooves. Each groove 61, 62, or 63 of the plastic substrate 60 has another bump 61, 621, or 631. Then, it repeats the above saying step of the color filtering layer photo-resist jetting according to the present invention. Each groove 62, 62, or 63 of the substrate 60 forms different color filtering layers photo-resists 31", 32", and 33" and the black photo-resist 52 and the passivation layer 42 fill around as shown in Figure 11. The bottoms of the above saying grooves 62, 62, and 63 form different ranges of heights. Therefore, while the light penetrating to each color filtering layer photo-resist 31", 32" or 33, different levels of reflective effects are occurred. Also, a transfective type color filter is formed. The transfective type color filter often uses on the mobile phone, the outdoor advertising display. The surrounding luminance is always changing but still needs to be required with a clear identify ability.